

In particular, independent Claim 1 is directed to a semiconductor device comprising a wiring which comprises tungsten or tungsten compound formed over a substrate, the wiring including a gate electrode and including argon, and an amount of sodium contained within the wiring is equal to or less than 0.3 ppm. Applicants respectfully submit that the features of this claim is not disclosed or suggested by the cited references.

The Examiner, however, contends in the Final Rejection, that Oikawa discloses a semiconductor device comprising wirings including a gate electrode (5) formed over a substrate (1), the wirings comprising a tungsten film, and wherein an amount of sodium within the tungsten film is equal to or less than 0.3 ppm (emphasis added). Applicants respectfully disagree.

The claimed invention clearly recites an amount of sodium within the wiring. In contrast, Oikawa discloses a concentration of sodium in a target, not within the wiring. See e.g. col. 6, lns. 13-31 and col. 8, lns. 1-16 in Oikawa. There is no disclosure or suggestion in Oikawa of the sodium concentration of the metal film of the wiring. The sodium concentration of the target is not the same as the sodium concentration in the metal film of the wiring. In fact, the Examiner agrees with Applicants.

As a further example to emphasize this difference, the specification of the present application recites a target purity (e.g. page 8, lns. 22-24) and a sodium concentration for a wiring (e.g. page 9, lns. 10-12 and page 10, lns. 6-11). Each of these is discussed separately, in a different place and manner in the specification since they are not the same. Hence, one skilled in the art reading the specification of the present application would understand that these are not the same and that the teaching regarding the target concentration is not the same as the teaching regarding the concentration of the wiring.

The Examiner states that it is agreed that the sodium concentration of the target is not the

same as the sodium concentration in the metal film of the wiring but contends that “[i]n fact, the sodium concentration should be less than that. However, the sodium concentration still meets the recited limitation of ‘equal to or less than.’” The Examiner cites no support for this statement or support for how one skilled in the art would get from a target concentration to a wiring concentration.

As the Examiner acknowledges, there is no disclosure in Oikawa of the sodium concentration of the wiring. Hence, this is not a proper anticipation rejection since all of the claimed elements are not disclosed in the cited reference.

Rather, the Examiner’s rejection appears to be a §103(a) obviousness rejection and seems to be based on his taking official notice that the concentration of the target is going to have some known relationship to the wiring concentration. However, as stated in MPEP 2144.03, the taking of official notice should only occur in rare situations and only be taken by the examiner where the facts asserted are well-known, or are common knowledge in the art and are capable of instant and unquestionable demonstration as being well-known. That is not the case here.

Further, if the applicant challenges the examiner, then the examiner must support his findings with adequate evidence. Applicants have challenged the Examiner in this case, but the Examiner has provided no evidence in support of his contentions.

Further, Oikawa discloses a sodium concentration only in a molybdenum target. There is no disclosure of an impurity concentration in other metals, such as tungsten.

Therefore, for at least the above-stated reasons, Oikawa does not disclose the claimed invention of independent Claim 1, the Examiner’s rejection is improper under the rules, and no evidence has been produced in support of the rejection or contentions in the rejection. Accordingly, it is respectfully requested that this rejection be withdrawn.

Claim Rejections - 35 USC §103

Claims 3, 10-11 and 13

The Examiner also rejects Claims 3, 10-11 and 13 under 35 USC §103 as being unpatentable over Oikawa et al. This rejection is respectfully traversed.

Each of these claims is a dependent claim. Therefore, for at least the reasons discussed above for independent Claim 1, each of these claims is also patentable over the cited references. Accordingly, it is respectfully requested that this rejection be withdrawn.

Claim 12

The Examiner also rejects Claim 12 under 35 USC §103 as being unpatentable over Oikawa in view of Ikeda et al. (JP 8-153722). This rejection is also respectfully traversed.

This claim is a dependent claim. Therefore, for at least the reasons discussed above for the independent Claim 1, this dependent claim is also patentable over the cited references. Accordingly, it is respectfully requested that this rejection also be withdrawn.

Claims 2 and 64-92, 103-114, 116-120

The Examiner also rejects Claims 2 and 64-92, 103-114, 116-120 under 35 USC §103(a) as being unpatentable over Oikawa in view of Okazaki (US 5,477,359). This rejection is also respectfully traversed.

In this rejection, the Examiner contends that “it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the substrate of Oikawa et al. as the glass substrate and the base insulating film comprising silicon nitride or silicon oxynitride, such as taught by Okazaki in order to improve the circuit performance.” Applicants respectfully disagree.

For example, with respect to rejection of independent Claims 64 and 83, Applicants submit that the Examiner's alleged motivation to combine references is faulty as neither Oikawa nor Okazaki teach or suggest that a glass substrate and a base insulating film are used in order to improve the circuit performance. Therefore, there is no motivation to combine Oikawa and Okazaki, the combination is improper and the rejection based thereon is improper.

Further, Claims 64 and 83 recite "a base insulating film comprising silicon nitride or silicon oxynitride over the glass substrate" and "a wiring comprising tungsten or a tungsten compound formed over the base insulating film, the wiring including a gate electrode" (emphasis added). In contrast, Okazaki discloses a gate electrode 303 over a glass substrate 301 and a gate insulating film 304, comprising silicon oxide or silicon nitride, above the gate electrode 303. See e.g. Fig. 14, col. 12, lines 20-37 in Okazaki. Hence, Okazaki does not teach or suggest the claimed base insulating film comprising silicon nitride or silicon oxynitride. Further, as the Examiner has admitted, Oikawa does not disclose a glass substrate and a base insulating film comprising silicon nitride or silicon oxynitride. Therefore, the device of Claims 64 and 83 cannot be obtained even when these references are combined. Accordingly, the rejection of independent claims 64 and 83 and those claims dependent thereon should be withdrawn.

Further, with regard to the rejection of independent Claims 74, 83 and 103, the Examiner also contends that although Oikawa and Okazaki do not teach the internal stress as claimed, "it would have been obvious to one having ordinary skill in the art at the time the invention was made to form the wiring having a desired... internal stress..., since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art." The Examiner cites In re Boesch, 205 USPQ 215 (CCPA 1980) in support of his rejection. However, in that case, it was determined that the cited references disclosed alloys with compositional limits overlapping the

claimed alloys and there was evidence introduced regarding what was known at the time of the invention regarding lowering in Nv value (which was the subject in dispute in the claims).

In contrast, there is no overlapping in this case and no evidence with regard to internal stress of the wiring. Hence, Boesch is not applicable to the present case, and there has been no showing of the claimed internal stress values. Therefore, the rejection of the claims should be withdrawn.

Accordingly, for at least the above-stated reasons, it is respectfully requested that this rejection be withdrawn.

Claims 93-102

The Examiner also rejects Claims 93-102 under 35 USC §103(a) as being unpatentable over Oikawa in view of Okazaki and further in view of Prall et al. (US 5,341,016). This rejection is also respectfully traversed.

For substantially the same reasons as discussed above for Claims 64 and 83, independent Claim 93 and the claims dependent thereon are also patentable over the cited references. Accordingly, it is respectfully requested that this rejection be withdrawn.

Conclusion

It is respectfully submitted that the present application is in a condition for allowance and should be allowed.

If any fee should be due for this response, please charge our deposit account 50/1039.

Favorable reconsideration is earnestly solicited.

Respectfully submitted,

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